Dorri, M., Mannan, R., Nobbs, A., & Madden, I. (2018). PD098: Use of a new Er: YAG laser setting (Quantum Square Pulse) for managing peri-implantitis. *Journal of Clinical Periodontology*, 76. [PD098]. https://doi.org/10.1111/jcpe.100_12914

PD098: Use of a new Er: YAG laser setting (Quantum Square Pulse) for managing peri-implantitis

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Background & Aim: Peri-implantitis is a growing public health concern. The key to disease prevention and treatment is the management of biofilm formation on titanium implant surfaces. Conventional treatments include non-surgical plaque control and chemo-mechanical debridement. Surgical treatments include exposure of the implant in combination with chemo-mechanical debridement or removal of the implant. The laser ablation has recently been suggested as a less invasive approach for the management of peri-implantitis. However studies have shown unwanted thermal side effects and delayed healing. The *Fotona Lightwalker* system introduces a new patented Quantum Square Pulse (QSP) setting that avoids excessive heat production. **Aims:** To investigate the effectiveness of the *Fotona Lightwalker* QSP Er: YAG laser ablation for the management of biofilms on titanium discs.

Methods: Biofilms of *Streptococcus gordonii* (SG) and *Enterococcus faecalis (EF)* were grown individually on titanium discs, which were then disinfected on one side and the remaining side was irradiated with the *Fotona Lightwalker* Er:YAG laser. The discs were then sonicated in a sterile phosphate buffer saline solution and the colony forming units (CFU) were calculated. The discs were irradiated with one of three laser settings: QSP; Super Short Pulse (SSP) or Micro Short Pulse (MSP). Live-dead fluorescence staining was carried out for visualisation of living and dead bacteria.

Results: The CFUs were significantly lower following the application of the laser QSP ablation setting compared to the MSP and SSP settings, for both the *SG* and *EF* biofilms ($p < 0.0001$). There were particular challenges utilising the fluorescence staining as an additional result.

Conclusion: The QSP setting was significantly more effective than MSP and SSP settings in the reduction of the bacterial load from biofilms of *S. gordonii* and *E. faecalis* on titanium. The QSP setting may be a very positive treatment adjunct in the cleaning of a topographically challenging implant surface.